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MATERIALS AND PROCESSES IN MANUFACTURING

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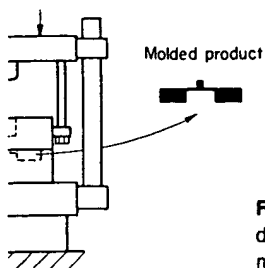


FIGURE 9-13. Schematic diagram of the transfer molding process.

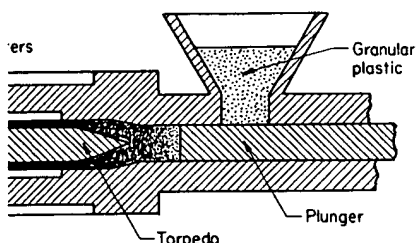


Diagram of the injection-molding process.

line. Inset shows plastic part being removed from (corporation.)

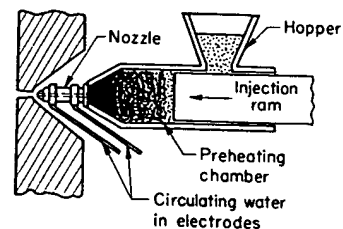


FIGURE 9-16. Jet molding process for injection-molding thermosetting plastics.

preheated. From the preheating chamber it is forced through the *torpedo* section, where it is melted and the flow regulated. It leaves the torpedo through a nozzle that seats against the mold and allows the molten plastic to enter the die cavities through suitable gates and runners. In this process the die remains cool, so the plastic solidifies almost as soon as the mold is filled. To ensure proper filling of the cavity, the material must be forced into the mold rapidly under considerable pressure; premature solidification would cause defective products. While the mold is being opened and closed and the part ejected, the material for the next part is being heated in the torpedo. The complete cycle requires only a few seconds. Figure 9-15 shows a typical injection molding machine.

Because thermosetting plastics must be held in the mold under temperature and pressure a sufficient time to permit the curing to be completed, a modification of the injection molding process must be used for this type of plastic. In the jet molding process shown in Figure 9-16, the plastic is preheated in the feed chamber to about 93°C (200°F) and then further heated to the polymerization temperature as it passes through the nozzle. The mold is held at an elevated temperature to complete the curing process. As soon as the charge for one cycle has nearly filled the die cavity, the nozzle is cooled to prevent the plastic in the nozzle from hardening and clogging the machine. Due to economic factors resulting from the relatively long cycle time, little injection molding of thermosetting plastics is done.

Plastic products with long, uniform cross sections are readily produced by *extrusion*, as depicted in Figure 9-17. The plastic material is fed from a hopper into a screw chamber from whence the rotating screw conveys it through a preheating section, where it is compressed, and then forces it

FIGURE 9-17. Extrusion process for producing plastic parts.

